REMARKS

Applicants acknowledge Examiner Lopez's time and courtesy during the personal interview of 3 March 2005 with applicants' representative James E. Ruland. No exhibit was shown or demonstration conducted, claims 1 and 14 were discussed, US Patent Nos. 5,210,816 (Iino), 6,319,634 (Berkey), and 6,263,706 (Deliso) were discussed, and proposed amendments are depicted above. A summary of the interview is included below.

Pending Claims

Claims 1–3, 7–13, 15 and 16 are pending with claims 4–6, 14 and 17 canceled by this paper. Applicants respectfully submit that the cancellation of these claims in no way acquiesces to the merits of any rejection. Moreover, applicants reserve the right to reintroduce these claims at a later date if ever desired.

Claim Amendments

The ranges in claim 1 have been hyphenated to clarify that the end points are included in the range.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1, 7, 10, 11 and 14–17 stand rejected as allegedly being anticipated by Iino. Applicants respectfully traverse these rejections.

Iino fails to teach feeding oxygen gas, hydrogen gas and a silica-forming reacting gas from a single burner oriented to define an angle of 90°–110°. Rather, Iino discloses a burner 8 supplying hydrogen gas and oxygen gas. See, e.g., FIG. 3 and col. 3, lines 56–66.

In addition, Iino fails to teach a silica matrix having a density distribution within 0.1 g/cm^3 in the entire porous silica matrix. Rather, Iino teaches a VAD method for making a

glass particulate soot 10 with a density higher at the outer circumferential portion as compared with the center portion. Particularly, Iino exemplifies a soot having a soot density ranging from less than 0.4 g/cm^3 to about 0.8 g/cm^3. See col. 4 and FIG. 4. Consequently, failing to teach these features, Iino cannot anticipate the claimed invention.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 7–11, 14 and 15 stand rejected as allegedly being unpatentable over Berkey in view of Iino and/or Deliso, and in further view of US Patent No. 6,333,284 (Otsuka). In addition, claims 3, 12 and 13 stand rejected as allegedly being unpatentable over Berkey in view of Iino and/or Deliso, and in further view of Otsuka, and further in view of US Patent No. 6,653,024 (Shiraishi). Applicants respectfully traverse these rejections.

At the outset, even if these references are allegedly combinable, their combined teachings fail to teach or suggest a process for obtaining a silica matrix with a distribution within 0.1 g/cm^3 by orientating a burner to define angle of 90° to 110°. Such a silica matrix can be vitrified into a quartz glass having a uniform fluorine concentration, and subsequently processed as, e.g., an optical member for a F_2 excimer laser.

As discussed in applicants' last reply, Berkey fails to teach or suggest a silica matrix having a density of 0.1 – 1.0 g/cm^3 with its distribution within 0.1 g/cm^3 (applicants' last reply inadvertently referred to the density and distribution with units as gm/cm^2, which is erroneous because the denominator should have been depicted as cm^3). Berkey fails to teach or suggest this distribution because Berkey discloses an OVD method. As such, the OVD method would make a glass tube with a lower density at the outer surface than at its center portion.

As a consequence, this density difference can create non-uniformity in the deposition of a material, e.g., fluorine, which in turn can invite a distribution of transmittance. See, e.g.,

the present specification at page 7, lines 22–34. Moreover, Berkey fails to teach or suggest obtaining a constant density soot to control the concentration of dopants. Rather, Berkey discloses using different types of dopants (e.g., col. 7, lines 31–43) and controlling other parameters while, e.g., doping during formation of the soot (e.g., col. 8, lines 20–34). Consequently, Berkey fails to lead one of ordinary skill in the art to the claimed invention.

Moreover, Berkey is not combinable with Iino. Rather, these references teach away from each other. Iino, as discussed above, teaches a higher soot density at the outer circumferential portion of the core as compared to the center portion. In marked contrast, an OVD process as disclosed by Berkey would provide a soot having a lower density at the outer surface than at the center portion. Consequently, these references teach away from each other. Moreover, combining the teaching of Iino with the teachings of Berkey would destroy the intended purpose of Berkey, namely an OVD process having a lower density at the outer surface. Thus, these references are not combinable. Moreover, even assuming they were combinable, they would not teach or suggest a silica matrix with a density distribution within 0.1 g/cm^3.

With respect to Deliso, Deliso has similar shortcomings as Berkey. First, Deliso discloses that the preferred method of forming the soot preform is the OVD method (see, e.g., col. 7, lines 15–18 and FIG. 1). As such, it would have similar shortcomings as Berkey, namely creating a preform with varying density. Thus, Deliso fails to teach or suggest making a soot with a density distribution within 0.1 g/cm^3.

Also, Deliso only insinuates that the amount of fluorine added during doping can be constant across the preform, assuming a constant soot density. See, e.g., col. 4, lines 55–60. However, Deliso does not teach or suggest a soot with constant density. Rather, Deliso teaches that by picking a dopant from different compounds and controlling dopant

parameters, such as doping times, one can control the concentration of dopant in the preform. See, e.g., cols. 4–6. It fails to teach or suggest maintaining a constant soot density to achieve such an objective. Consequently, even if Deliso is combinable with Berkey, their combined teachings fail to teach or suggest a silica matrix having a density of 0.1 – 1.0 g/cm^3 with its distribution within 0.1 g/cm^3. Consequently, applicants respectfully submit that these rejections should be withdrawn.

Supererogatorily, the present invention provides significant and unexpected results. Particularly, Applicants have discovered, as discussed above, that if a matrix having a uniform density is obtained by controlling the angle of the burner, the matrix can vitrify into a quartz glass having a uniform fluorine concentration. Thus, a synthetic quartz glass having uniform distributions of transmittance and refractive index can be obtained. These significant and unexpected results are demonstrated in the examples and comparative example at pages 11–14 of the present specification. Particularly, comparative example 1 produces a cylindrical form by feeding the gases under the same conditions as in example 1 and carrying out hydrolysis in an oxyhydrogen flame. The angle between the center axis of the matrix and the center axis of the reactive flame ejected from the burner is 130°. As depicted in Table 1 at page 14, example 1 had a refractive index distribution of 5×10^{-4} as compared to a refractive index distribution of 1×10^{-3} for comparative example 1. Additionally, example 1 has a transmittance percent of 83.2 – 84% versus comparative example 1 having a transmittance percent of 75.0 – 80.5%. These results are significant and unexpected.

With respect to the teachings of the other secondary references, namely Otsuka and Shiraishi, because they do not cure the basic deficiencies of the primary references, their combination with the other prior art would not supply the missing teachings to render the claims obvious. So as not to burden the record further, Applicants will not discuss these

references in detail except to state that Applicants do not necessarily acquiesce to any of the statements in the Office Action referring to such secondary references and reserve the right to comment later regarding the same, if ever necessary.

In view of the above, favorable reconsideration is courteously requested. If there are any remaining issues which can be expedited by a telephone conference, the examiner is courteously invited to telephone counsel at the number indicated below.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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